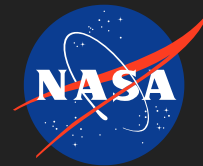


# High-Density Diffraction Imaging and Non-Imaging Grating Elements for EUV and X-ray Spectroscopy Fabricated by DUV Reduction

## Photolithography, Phase I

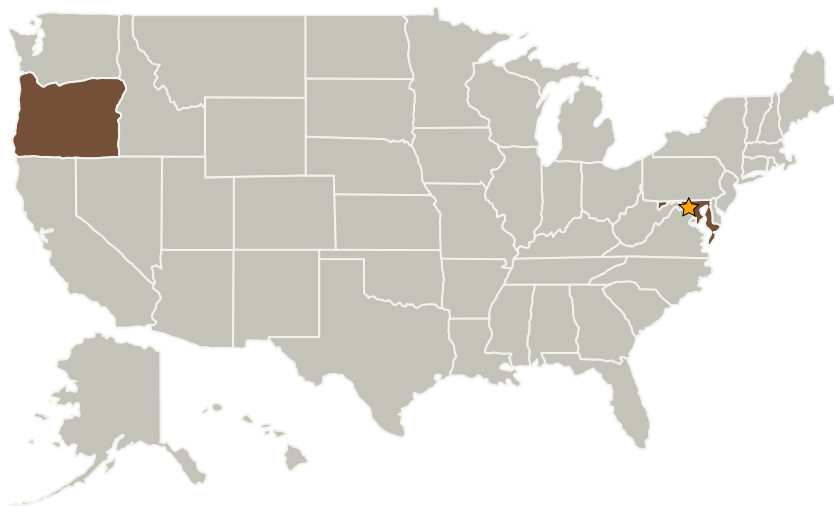
Completed Technology Project (2006 - 2006)



### Project Introduction

There is a need for lightweight high-density (4000+ lines/mm) novel diffraction grating elements in modern telescopes to advance EUV and X-ray astrophysics. Current grating technologies (ruling and holographic beam interference) do not provide optimal solution for all grating requirements. In response to NASA request, we propose to apply state-of-the art DUV reduction photolithographic tools developed for modern semiconductor industry and LightSmyth's proven design expertise in the application of this technology to the development of grating devices with constant and varying line spacing (VLS). The proposal will focus on four major areas: (i) Development and demonstration of constant and VLS reflective diffraction grating elements for EUV and X-ray spectroscopy at glazing angle of incidence with straight lines. (ii) Development and demonstration of VLS reflective diffraction grating elements for EUV and X-ray spectroscopy at glazing angle of incidence with curved lines to produce focusing diffraction grating elements on a plane substrate. (iii) Design of in-plane and off-plane reflective diffraction grating elements for NASA's Constellation-X. (iv) Design of VLS blazed near-normal incidence focusing diffraction grating elements on plane substrate for EUV imaging spectroscopy to replace diffraction grating on toroidal substrate for Goddard Space Flight Center's NEXUS project.

### Primary U.S. Work Locations and Key Partners



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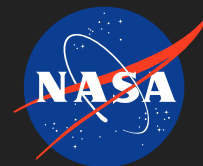
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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
LightSmyth Technologies	Supporting Organization	Industry	Eugene, Oregon

Primary U.S. Work Locations	
Maryland	Oregon

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.1 Detectors and Focal Planes